RadiSys®

SERVICE MANUAL

EPC®-2102
P5000HX2(-M) Series SBC

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Limited Warranty

A. RadiSys Corporation warrants that the item sold by it hereunder will be free from defects in materials or workmanship, under normal use and service, for a period of 2 years from date of shipment. Said item will meet the specifications in effect at the time of manufacture. The sole obligation of RadiSys under this warranty shall be, at its option, to repair or replace, without charge, any defective component of said item, within a reasonable period of time.

B. RadiSys Corporation shall not be liable under this warranty for (i) the item that the Buyer alleges to be defective and was repaired or altered by someone other than an authorized representative of RadiSys, unless such repair or alteration was effected pursuant to prior written approval of RadiSys, or (ii) where the Buyer fails to notify RadiSys of any alleged defect within the period of warranty, or (iii) where the Buyer fails to return the allegedly defective item to RadiSys Corporation, in Houston, Texas, USA, freight prepaid, or (iv) where the item was altered or damaged in a way which RadiSys reasonably determines to affect the performance and reliability of the item, or (v) where the item was subject to misuse, neglect, or accident. The rights and remedies granted to the Buyer under this paragraph constitute the Buyer's sole and exclusive remedy against RadiSys Corporation, its officers, agents, and employees, for negligence, inexcusable delay, breach of warranty, express or implied, or any other default relating to the item or the duties of RadiSys to eliminate any errors.

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Every effort has been made to ensure that the information provided in this manual is complete and accurate. However, technical inaccuracies or typographical errors may be inadvertently included. RadiSys assumes no responsibility for any errors that may be contained in this document. RadiSys makes no promise to update or keep current the information contained in this document. Information in this document, including product specifications, is subject to change without notice.

All tradenames referenced are the service mark, trademark, or registered trademark of the respective manufacturer.

Important

Always use caution when handling or operating the equipment. Only qualified and trained electronics service personnel should access the equipment. Use extreme caution when installing or removing components. For additional information, please contact RadiSys Technical Support at 800–627–8700 or 713–541–8200 Monday through Friday between 8:00 a.m. and 5:00 p.m., Central Time, continental USA.

Wichtig

Arbeiten am System bzw. Betrieb des Systems, sollten immer mit der nötigen Vorsicht vorgenommen werden. Nur qualifiziertes und ausgebildetes Fachpersonal sollte am Inneren des Gerätes arbeiten. Beim Installieren und Entfernen von Komponenten ist besondere Vorsicht geboten.

Für weitere Informationen wenden Sie sich bitte an den Technical Support von RadiSys:

- USA: 800–627–8700 oder 713–541–8200 Montags bis Freitags von 0800 Uhr bis 1700 Uhr, Central USA.
- International: +31–36–5365595 Montags bis Freitags von 0830 Uhr bis 1700 Uhr. (CET GMT +1.00)

Changes or modifications not expressly approved by RadiSys Corporation could void the product warranty and the user's authority to operate the equipment.

Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can emit radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at the user's expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation

Any change or modification not expressly approved by the manufacturer is prohibited and could void the user's authority to operate the equipment.

This product also meets requirements for compliance with EN55022, Class B ITE.

ISO-9001

CERTIFICATED FIRM

Symbols

Notice:
This symbol indicates an item for special consideration.

Warning:
This symbol indicates the presence of a potential hazard that can cause personal injury or damage to the equipment. Only qualified and trained electronics service personnel should access the equipment.

Customer Support

Accessing the Web Site

In-depth printable service manuals and other documentation are available for download from the RadiSys Web site:

http://www.radisys.com

Then click on Support to access a link to the documentation, drivers, and BIOS. Documentation is available at this Web site in Adobe® Acrobat® .PDF format, and may be viewed and printed using the free Acrobat® Reader™ software. BIOS files are available as self-extracting disk image files. Links are provided to various partners' web sites where any files and tools needed to install drivers are available for download.

Calling Technical Support

1. Have the RadiSys product model and serial number available.
2. Call Technical Support:
   - In the continental USA, Monday – Friday, 8:00 a.m. – 5:00 p.m., Central Time, dial 800–627–8700.
   - Outside the USA, dial 713–541–8200 (add long distance/international access codes).
   - In Europe, Monday – Friday, 8:30 a.m. – 5:00 p.m., dial +31–36–5365595.

Inspection of Contents / Packaging of Product

The packaging for this product has been tested to assure that it will withstand responsible handling by the carrier.

Caution: Inspect contents immediately and file a claim with the delivering carrier for any damage. Save the shipping box and packaging material to use for any further shipment of this equipment.

However, if the packaging is damaged and is not suitable for shipment, call RadiSys Technical Support to obtain new packaging. The warranty may be void if the product is returned using unapproved or damaged original packaging.

Returning Your Product

A Returned Material Authorization (RMA) number must be written on the outside of the shipping carton of all equipment returned to RadiSys for service and/or repair. It is recommended that any correspondence included with the carton contents also refer to the RMA number.

Note: The factory will refuse the shipment if it is sent freight collect or if it does not display an RMA number.

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1 Introduction

This chapter discusses the primary features of the EPC-2102 Single-Board Computer.

If you are familiar with the primary components and functions of the EPC-2102, and you wish to quickly begin operating the SBC, go to Chapter 2, “7 Steps to Operation,” page 5. Then read this chapter later at your convenience.

EPC-2102 (P5000HX2(-M)) Series

Overview

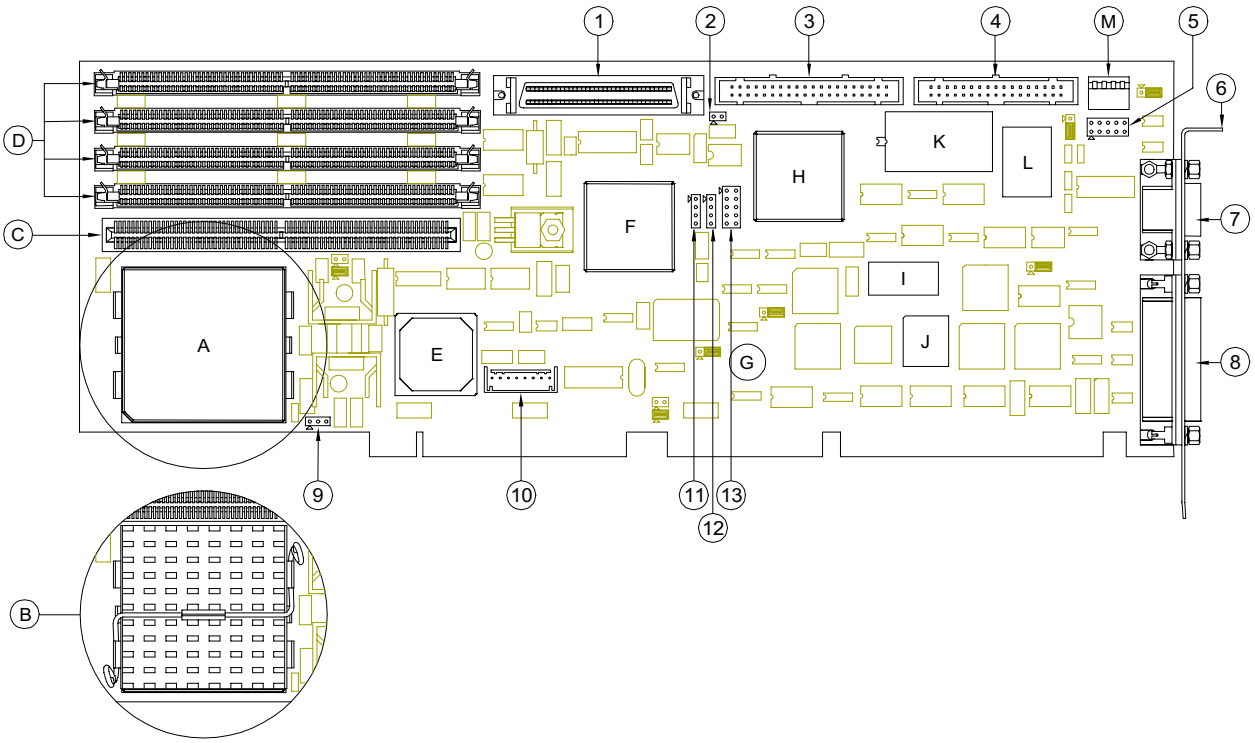
The RadiSys EPC-2102 single-board computer (SBC) provides the following features:

- Intel™ Pentium® processor:
  - 100/133/166 MHz, 64-bit Classic Pentium (P54C) or
  - 166/200/233 MHz, 64-bit Pentium with MMX™ (P55C)
- Intel 430HX PCIset
  - 82439HX System Controller (TXC, or North-Bridge)
  - 82371SB PCI I/O IDE Xcelerator (PIIX3, or South-Bridge)
- Intel 82091AA Advanced Integrated Peripheral (AIP)
- 4 Mb (512 KB x 8) flash memory
- Level 2 write-back cache socket for 256 or 512 KB pipeline burst COAST SRAM
- Four SIMM sockets for up to 256 MB scaleable DRAM
  Note: The EPC-2102 supports Parity/FPM or Non-Parity, ECC, or up to 128 MB EDO
- Two serial ports (one RS-232 only; one RS-232 or RS-422)
- Parallel port (AT-compatible/bi-directional/enhanced operations)
- Floppy drive controller
- PCI EIDE hard disk drive controller
- PCI Adaptec AIC-7880 UltraSCSI controller

For more information on the components of the EPC-2102, contact:

Company	Telephone	Website
Intel Corporation	(602) 554-8080	http://www.intel.com
Adaptec, Inc.	(408) 945-8600	http://www.adaptec.com
PCI Special Interest Group	(503) 696-2000	http://www.pcisig.com
PICMG	(781) 246-9318	http://www.picmg.com

Figure 1. EPC-2102 Components and Layout



A. Intel Pentium P54C/P55C Processor
B. Pentium Processor with Heatsink
C. Level 2 SRAM Cache Socket
D. DRAM SIMM Sockets
E. Intel 82439HX System Controller (TXC, or North-Bridge)
F. Adaptec AIC-7880 UltraSCSI Controller
G. Speaker
H. Intel 82371SB PCI I/O IDE Accelerator (PIIX3, or South-Bridge)
I. Flash Device
J. Auxiliary BIOS
K. Dallas DS12887 Real-Time Clock
L. Intel 82091AA Advanced Integrated Peripheral (AIP)
M. DIP Switch Block

1. SCSI Drive Header
2. IDE/SCSI Activity LED Header
3. EIDE Drive Header
4. Floppy Drive Header
5. Serial Port 2 Header
6. I/O Bracket
7. Serial Port 1 Connector
8. Parallel Port Connector
9. Auxiliary CPU Fan Header
10. Keyboard Header
11. USB Port 0 Header
12. USB Port 1 Header
13. PS/2 Mouse Header

Notes

2 7 Steps to Operation

This chapter describes basic precautions for handling the EPC-2102.

This chapter then outlines the basic steps for setting up the SBC:

1. Check jumper settings
2. Check switch settings
3. Install the SBC
4. Attach peripheral devices to headers
5. Attach peripheral devices to connectors
6. Power-on the system
7. Run the Setup Utility

Handling the EPC-2102

Overview

This section suggests basic precautions when handling the EPC-2102 series SBC.

Static Electricity

The EPC-2102 is designed to protect against ESD (electro-static discharge) and excessive voltage. However, excessive static electricity can damage components.

Before you handle the SBC, use the grounding wrist strap provided with the system to discharge static electricity. Instructions for using the wrist strap are printed on the strap's envelope.

Always handle the SBC by the edges to help prevent accidental damage that can be caused by static discharge (Figure 2).

Safety

It is important to protect yourself and your equipment before you perform any of the procedures outlined in this manual.

You should check the configuration before you install the SBC. If the SBC is already installed in your system and you need to change the configuration, power-off the system and disconnect all power cords from their source. Follow all safety precautions as outlined by the chassis manufacturer.

To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Only qualified, experienced electronics personnel should access the interior of the chassis and handle the equipment.

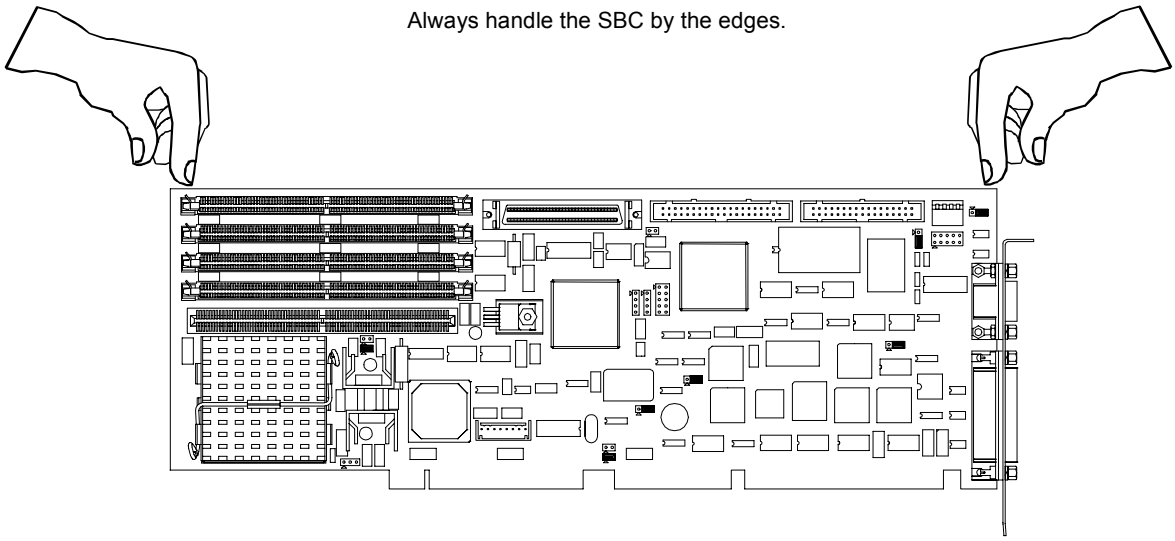
Next...

Before you install the SBC in a chassis, check the following:

- Jumper settings, outlined in Step 1, page 8
- DIP switch settings, outlined in Step 2, page 10

Pay particular attention to the switch settings. The jumper settings are preconfigured at the factory and are appropriate for most applications.

Figure 2. Safely Handling the SBC



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Step 1: Check Jumper Settings

Overview

Before you install the EPC-2102 onto a passive backplane in a chassis, check the jumper settings on the SBC (Figure 3).

Definition

A *jumper* is a small "bridge" that connects two pins on a jumper block. The position of a jumper affects the device's operational parameters.

Jumper Blocks

The EPC-2102 contains:

- Four two-pin jumper blocks (JP6, JP8, JP9, and JP10)
- Five three-pin jumper blocks (JP2, JP3, JP4, JP5, and JP7)

Settings

Table 1. Jumper Block Settings

2-Pin Jumper Blocks

JP9	JP10	Host Bus Speed
None	1—2	66.6 MHz (default)
1—2	None	60.0 MHz
1—2	1—2	50.0 MHz

JP6	JP8	Bus/Core Ratio†	CPU Speed
None	None	2/3	100 MHz
None	1—2	1/2	133 MHz
1—2	1—2	2/5	166 MHz
1—2	None	1/3	200 MHz
None	None	2/7	233 MHz
The Bus Core Ratio is based on the Host Bus Speed at 66.6MHz.			

3-Pin Jumper Blocks

	Serial 2 Configuration	
JP2, JP3, JP5	2—3	RS-232 (default)
	1—2	RS-422

	Watchdog Timer	
JP4	2—3	Inactive (default)
	1—2	Active

	Next Step OS Configuration	
JP7	2—3	Normal Operation (default)
	1—2	Use this setting when running Next Step OS and experiencing problems with PS/2 mouse

Figure 3. Jumper Block Locations

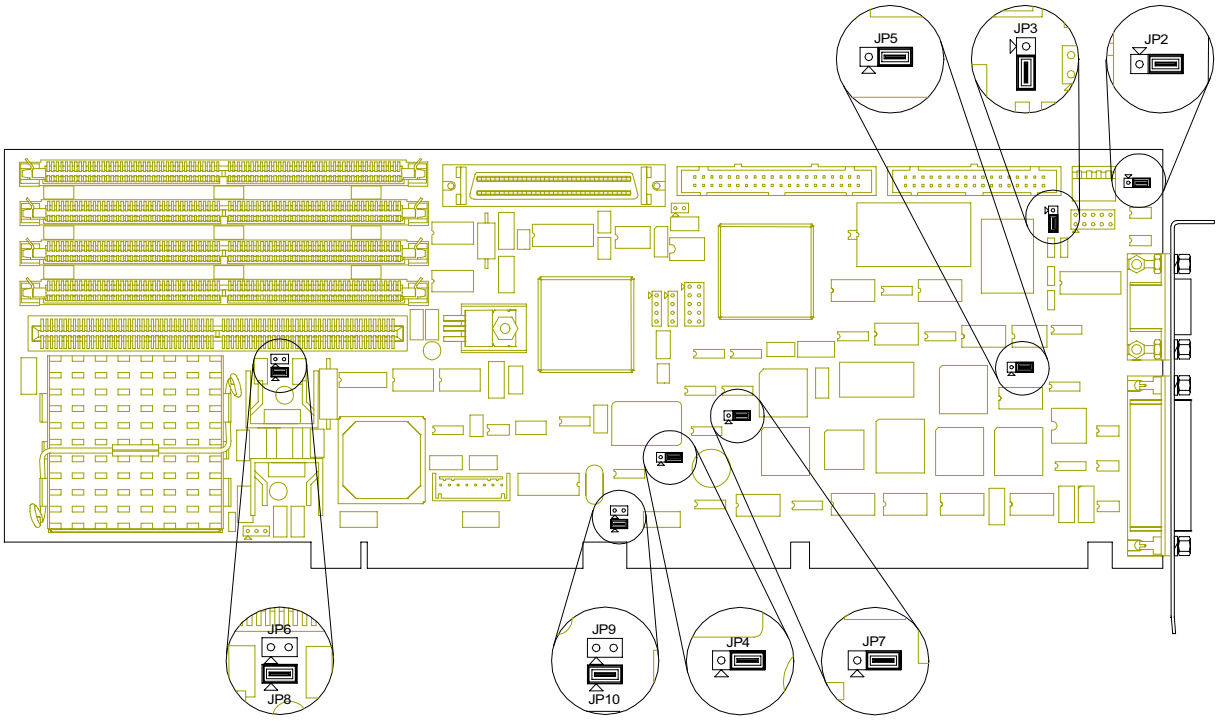


Table 2. Jumper Functions

	Jumpers	Function
2-Pin	JP6, JP8	CPU Speed
	JP9, JP10	Host Bus Speed
3-Pin	JP2, JP3, JP5	Serial Port 2 Configuration
	JP4	Watchdog Timer
	JP7	Next Step OS Configuration

To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Step 2: Check Switch Settings

Overview

After you check the jumper settings, check the switch block on the EPC-2102 for proper settings (Figure 4).

Switch Block

The switch block contains four DIP switches that you can configure to affect the following items:

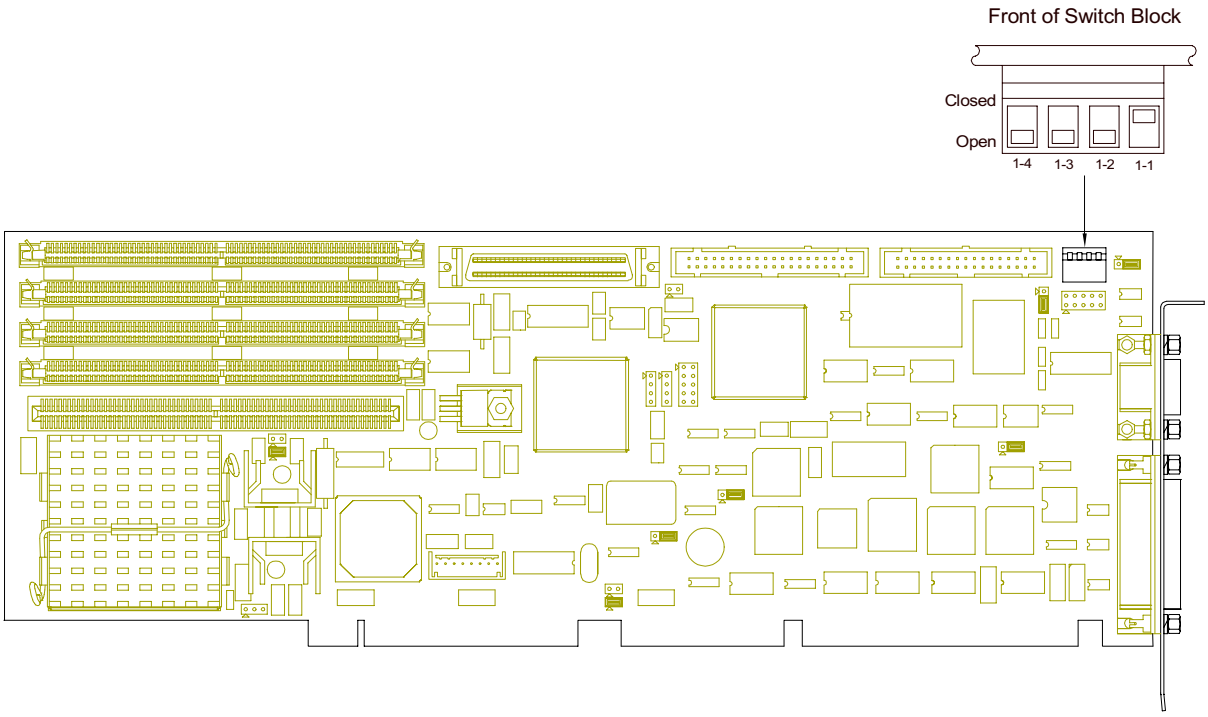
- Default monitor type
- On-board ROM access
- CMOS RAM
- Configuration ports

Settings

Table 3. Switch Settings

SW1-1	**Default Monitor Type**	
	Open	Monochrome monitor
	Closed (default)	Color monitor
SW1-2	**On-Board ROM Access**	
	Open (default)	Flash memory enabled; auxiliary ROM mode disabled
	Closed	Flash memory disabled; auxiliary ROM mode enabled
SW1-3	**CMOS RAM**	
	Open (default)	Normal operation of CMOS RAM
	Closed	Factory default values for the Setup Utility are loaded into CMOS RAM
SW1-4	**Configuration Ports**	
	Open (default)	Configuration ports are mapped to I/O address 270/271
	Closed	Configuration ports are mapped to I/O address 370/371

Figure 4. Switch Block Location



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Step 3: Install the SBC

Overview

Before you connect any peripheral devices to the EPC-2102, install the SBC onto a passive backplane in a chassis (Figure 5).

Procedure

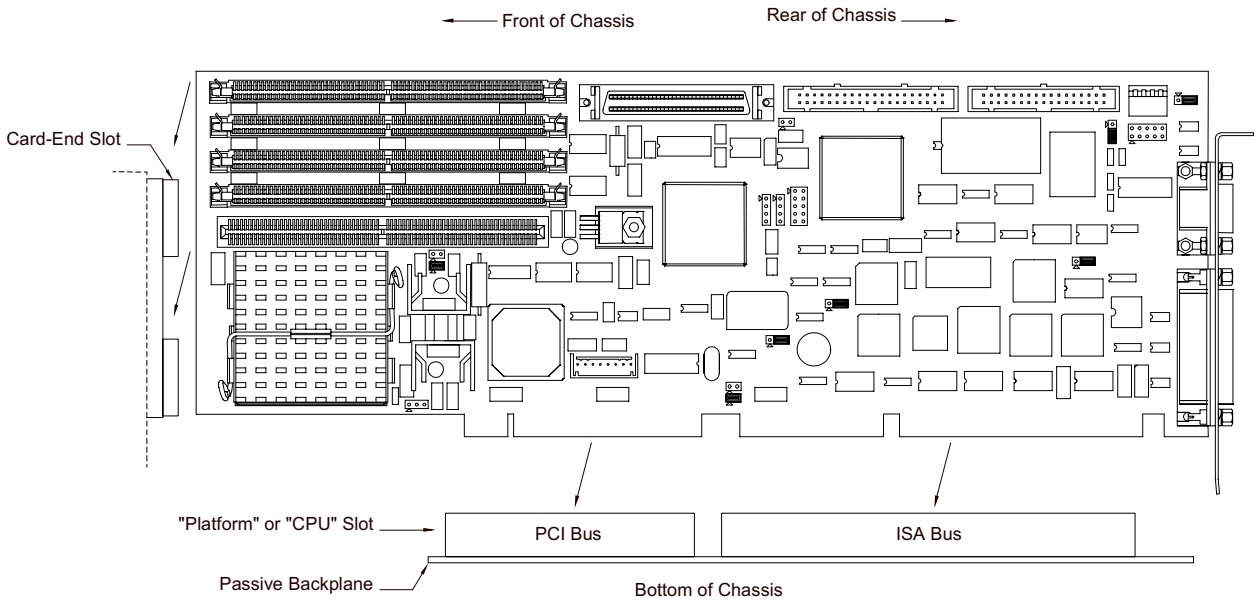
Table 4. Installing the SBC

Step	Action
1	Power-off the system and disconnect all power cords. **Note:** Use the grounding wrist strap provided with the system to discharge static electricity.
2	Remove the chassis cover.
3	Detach the circuit card hold-down bracket (if required). This bracket reaches across the tops of the circuit cards and holds them in place.
4	Locate the “Platform” or “CPU” slot on the passive backplane. **Note:** The SBC will not function to its fullest capabilities if it is not installed in the proper slot. For example, if installed in an ISA slot, the SBC will operate, but it will not be able to communicate with 3rd party PCI devices.
5	Remove the I/O bracket spacer from the rear of the chassis (if required). This spacer occupies the area where the SBC’s I/O bracket is accessed from the rear of the chassis.
6	Insert the SBC into the chassis with the card edge aligned in the card-end slot and the I/O bracket in the chassis I/O slot. Lower the SBC to the “Platform” or “CPU” slot on the backplane. Carefully push the SBC connectors into the slot on the backplane. Ensure that the I/O bracket is accessible through the rear of the chassis.
7	Secure the I/O bracket to the fastening lip on the chassis.
Note: To install the EPC-2102 onto a passive backplane not manufactured by RadiSys, follow the instructions provided by the manufacturer of the backplane.	

If the SBC is installed into a chassis not manufactured by RadiSys, a custom cable might be needed to adapt the keyboard header to the wiring in the chassis. RadiSys does *not* provide such a cable.

The SBC requires a minimum airflow of 200 linear feet per minute (LFM) unimpeded across the CPU within 0 to 60 °C (32 to 140 °F) ambient temperature. Operations outside these specifications could void the warranty.

Figure 5. Installing the SBC



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Step 4: Attach Peripherals to Headers

Overview

After you have installed the EPC-2102 onto a passive backplane in a chassis, attach the necessary peripheral devices to the appropriate headers on the SBC (Figure 6).

SCSI Drive

Up to fifteen SCSI devices can be attached to this header via a 68-conductor flat cable in a daisy-chain configuration.
Note: The "red stripe" on the cable should be near Pin 1 on the header.

EIDE Drive

Two EIDE (backwards-compatible with IDE) hard disk drives can be attached to this header via a 40-conductor flat cable.
Note: The "red stripe" on the cable should be near Pin 1 on the header.

The BIOS will support up to four IDE drives. To use 3 or 4 drives, a 2nd controller is required. The 2nd controller must be configured to use IRQ15 and I/O Ports 170-177h.

IDE/SCSI Activity LED

This header connects the IDE or SCSI drive activity LED cable to the SBC.
Note: Pin 1 is the anode; Pin 2 is the cathode.

FDD

Two floppy disk drives can be attached to this header via a 34-conductor flat cable.
Note: The "red stripe" on the cable should be near Pin 1 on the header.

Serial Port 2

A serial device can be attached to this header (16550-compatible) via a 10-conductor flat cable. If connecting a serial mouse, be sure to use a shielded cable.
Note: The "red stripe" on the cable should be near Pin 1 on the header.

Improperly connecting the cable to this header can cause damage to the cable, SBC, and external serial device, and could void the warranty.

USB Ports

A 4-conductor USB cable can be attached to each of these headers. See page 30 for pinouts.
Note: Software drivers appropriate to the OS will be needed to operate USB devices. RadiSys does *not* supply such drivers.

Mouse

A PS/2 mouse can be attached to this header via a 10-pin (2x5) cable adapter.

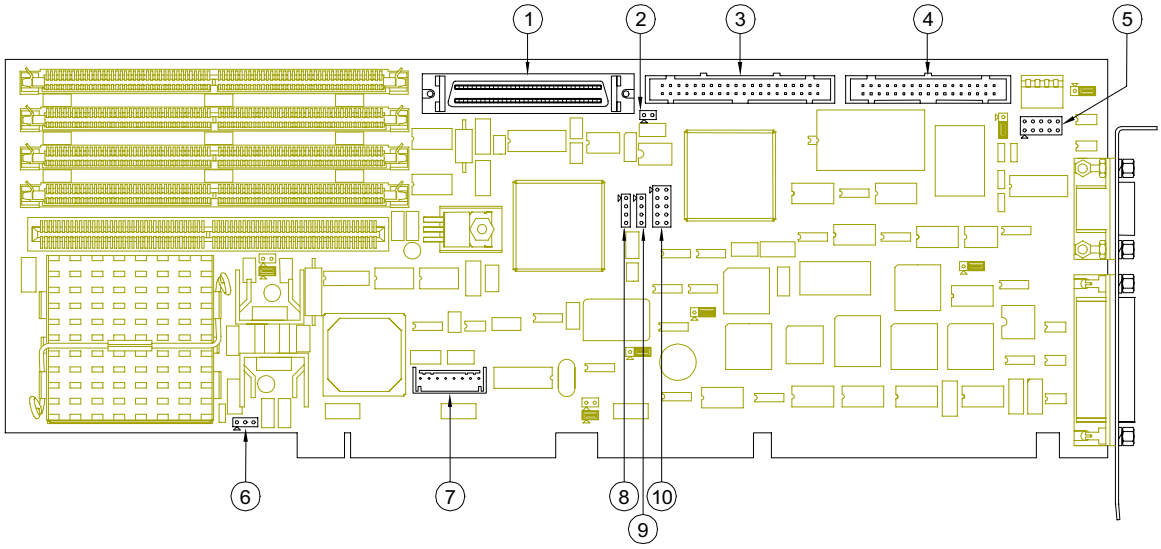
Keyboard

An AT or PS/2 keyboard can be attached to this header with an appropriate 8-pin cable.
Note: The sockets on the RadiSys keyboard header cable are numbered in reverse order when compared to the pinout of the keyboard header on the SBC.

Auxiliary CPU Fan

An auxiliary CPU fan can be attached to this header.
Note: For more information on thermal specifications, see page 26.

Figure 6. Peripheral Header Locations



1. SCSI Drive
2. IDE/SCSI Activity LED
3. EIDE Drive
4. Floppy Drive
5. Serial Port 2
6. Auxiliary CPU Fan
7. Keyboard
8. USB Port 0
9. USB Port 1
10. PS/2 Mouse

To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

For pin signals and positions, see page 28.

Step 5: Attach Peripherals to Connectors

Overview

After you have attached peripheral devices to the headers on the EPC-2102, attach devices to connectors on the SBC (Figure 7).

To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before connecting or disconnecting any cables for the equipment.

Serial Port 1

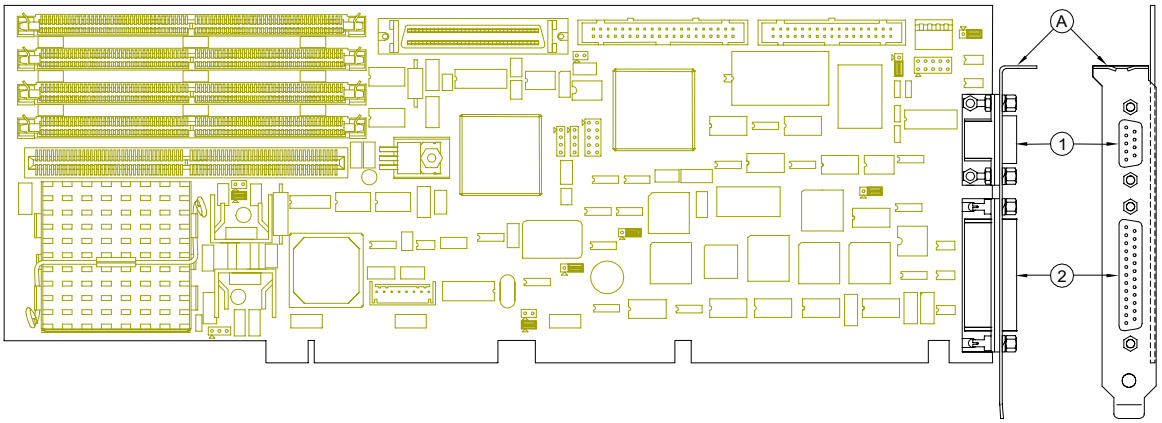
This serial port (16550-compatible) is a DE9P (male) connector.

Parallel Port

The IEEE 1284 parallel port:

- Is a DB25S (female) connector
- Provides a Centronics-compatible printer interface
- Supports AT-compatible/bi-directional/EPP/ECP operations

Figure 7. Peripheral Connector Locations



A. I/O Bracket

1. Serial Port 1
2. Parallel Port

To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment. To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

For pin signals and positions, see page 28.

Step 6: Power-On the System

Overview

After you have installed the EPC-2102 and connected all devices, power-on the system.

No Power

If the system does not power-on, check all power connections and the power source.

If power connections are secure and the power source is adequate, contact Technical Support at 800-627-8700 or 713-541-8200 between 8:00 a.m. and 5:00 p.m., Central Time, USA. For more information, see “Customer Support,” page vi.

Startup

After you power-on the system, it will:

- Execute the Power-On Self Test (POST) to ensure that the system is functional and properly configured
- Start the operating system

Setup

During the POST, you can access the Setup Utility (Figure 8) to configure the system.

Before using the SBC for the first time, you should verify the system settings in the Setup Utility. See page 19.

Step 7: Run the Setup Utility

Overview

The BIOS (**B**asic **I**nput/**O**utput **S**ystem) Setup Utility allows you to configure the operations of the EPC-2102.

Access

To access the Setup Utility, press **F2** when prompted during the Power-On Self Test (POST).

Main Menu

The Setup Utility (Figure 8) displays a main menu that contains two areas:

1. Options: The options menu is on the left side of the screen
   - Basic
   - Advanced
   - PCI
2. Summary Information: The current settings are on the right side

Operation

Use the following keys to operate the Setup Utility:

Key	Action
Up Arrow (↑)	Move the cursor up one line.
Down Arrow (↓)	Move the cursor down one line.
Enter	Select an item to view or modify.
Esc	Save the settings and reboot.
F5	If you are having trouble seeing the cursor, press F5 to toggle between color and monochrome on a VGA monitor.

Figure 8. Setup Utility Main Menu

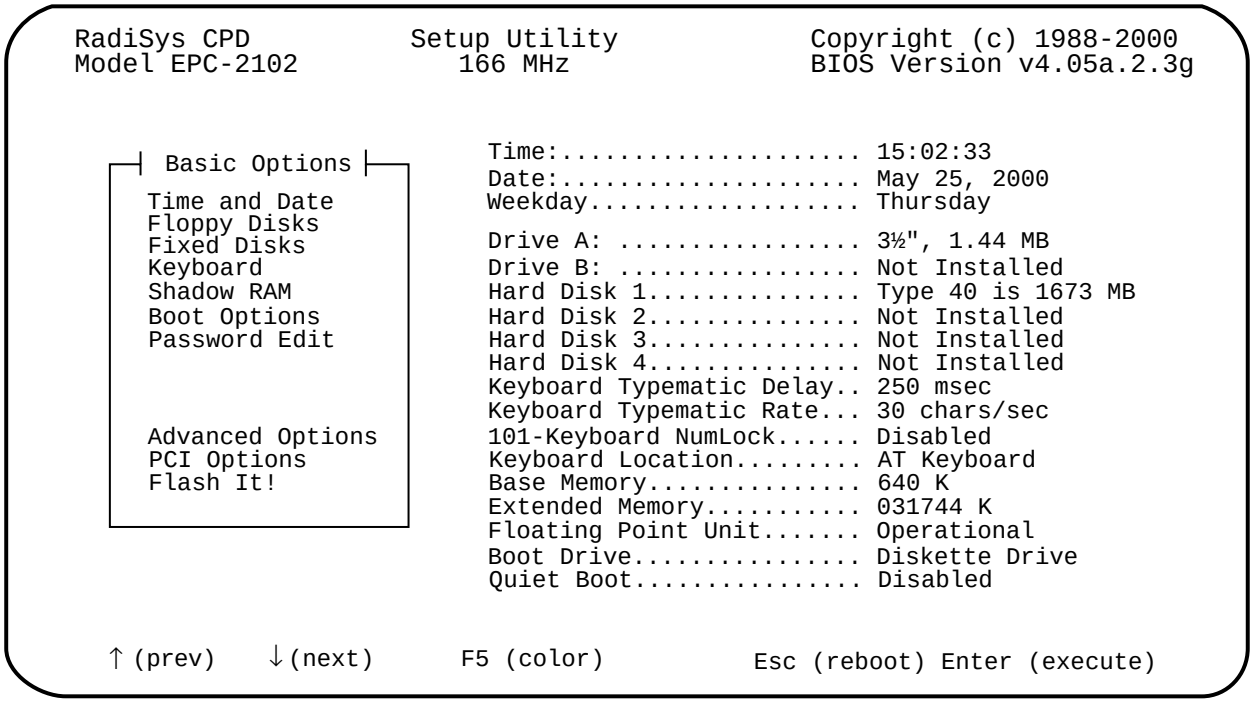


Table 5. Basic Options

Item	Option	Default Setting	Alternate Settings
Time and Date	Set Time and Date	• Time: Current • Date: Current • Weekday: Current	N/A
Floppy Disks	Floppy Controller	Enabled	Disabled
	Select Drive A: Type	3½ Inch, 1.44MB	Not Installed, 5¼ Inch 360 KB, 5¼ Inch 1.22 MB, 3½ Inch 720 KB, 3½ Inch 2.88 MB
	Select Drive B: Type	Not Installed	5¼ Inch 360 KB, 5¼ Inch 1.22 MB, 3½ Inch 720 KB, 3½ Inch 1.44 MB, 3½ Inch 2.88 MB
	Floppy Seek during POST	Enabled	Disabled
Fixed Disks	IDE Controller Setup	Primary (1F0-1F7h)	Disabled
		Note: The primary IDE controller cannot be set to the secondary controller (170-177h IRQ15).	
	Auto Detect IDE Drives	Enabled	Disabled
	Large Disk DOS Compatible	Enabled	Disabled
		Note: Disable this feature only if the OS performs drive translation (ex. Unix).	
	Set Hard Disk 1/2/3/4 Type	• Type: 0 • Cylinders: 0 • Heads: 0 • Sectors: 0 • Size: 0 • Translate Mode: Std. • IO Transfer Size: 16 Bit • Transfer Mode: Std. • Block Transfer Sectors: 1	• Translate Mode: LBA • IO Transfer Size: 32 Bit • Transfer Mode: PIO 1, PIO 2, PIO 3, PIO 4 • Block Transfer Sectors: 2, 4, 8, 16
		Note: The BIOS will support up to four EIDE (or IDE) hard disk drives.	
Keyboard	Keyboard Typematic Sound	Enabled	Disabled
	Keyboard Typematic Delay	250 msec	500 msec, 750 msec, 1000 msec
	Keyboard Typematic Rate	30 chars/sec	3.7 chars/sec, 2.5 chars/sec
Shadow RAM	**Note:** Each region with a ROM image will be listed	Shadow	ROM
		Note: • ISA Adapter ROM can be Shadow or ROM • The CPU BIOS (F000-FFFF) will be Shadow • Each PCI option will be Shadow and cannot be set to ROM • E000-EFFF is forced to Shadow during POST and is set to ROM before OS loads	
Boot Options	101-Key Keyboard NumLock at Boot	Enabled	Disabled
	Set Boot Drive Sequence	Diskette Drive	Hard Drive
	Report POST Errors	Enabled	Disabled
	Report Option ROM Errors	Enabled	Disabled
	Show F2 Message for Setup	Enabled	Disabled
		Note: If this feature is disabled, the Setup Utility can still be accessed at startup.	
	Quiet Boot Enable/Disable	Disabled	Enabled
		Note: If enabled, this feature will replace status messages with the RadiSys logo.	
Password Edit	Password Options	Disabled	Setup Only, Setup and Boot
	Password Edit	New Password entry with verification	N/A
Flash It!	RadiSys Flash-It	**Enter** to Flash	Esc to Exit
	Note: Flash-It can only be executed if no setup options were changed from when the Setup Utility was entered. This prevents Setup from being configured in such a way that will not allow the system to boot.		

Table 6. Advanced Options

Item	Option	Default Setting	Alternate Settings
Serial Ports	16550 Compatible UART 1	03F8h IRQ4	Disabled, 02F8h IRQ3, 03E8h IRQ4, 02E8h IRQ3
	16550 Compatible UART 2	02F8h IRQ3	Disabled, 03F8h IRQ4, 03E8h IRQ4, 02E8h IRQ3
Parallel Ports	Select Parallel Port Address	0378h IRQ7	Disabled, 0278h IRQ7, 03BCh IRQ7, 0378h IRQ5, 0278h IRQ5, 03BCh IRQ5
	Parallel Port Mode	AT Compatible	PS/2 Compatible, EPP, ECP
		Note: ECP requires a DMA channel.	
	Parallel Port DMA	DMA Channel 1	DMA Channel 3
		Note: This feature is available only if the Parallel Port Mode is set to ECP.	
Redirection	Serial Redirection Destination	Disabled	03F8h IRQ4, 02F8h IRQ3, 03E8h IRQ4, 03E8h IRQ3, 02E8h IRQ4, 02E8h IRQ3
	Serial Redirection BAUD Rate	38400	9600, 19200, 56000
Memory Cache	External Cache	Disabled	Enabled
Advanced Chipset	DRAM Speed	70ns	60ns
		Note: This should only be set to 60ns if all installed SIMMs are rated at 60ns.	
	DMA Alias	Disabled	Enabled
		Note: Disable this feature if a device resides on the ISA bus using I/O ports 90h/9Fh.	
	ECC/Parity Config	Parity	Disabled, ECC
		Note: ECC requires Parity (x36) SIMMs.	
	Memory Gap Block Size	Disabled	512 - 640KB, 15 - 16MB, 14 - 16MB, ISA at 512 - 528MB
	Gap Reporting to OS	Enabled	Disabled
		Note: To avoid problems with HIMEM.SYS, do not disable this feature.	
I/O Recovery	8 Bit I/O Recovery Time	4.5 SYSCLK	3.5 SYSCLK, 5.5 SYSCLK, 6.5 SYSCLK, 7.5 SYSCLK, 8.5 SYSCLK, 9.5 SYSCLK, 10.5 SYSCLK, 11.5 SYSCLK
	16 Bit I/O Recovery Time	4.5 SYSCLK	3.5 SYSCLK, 5.5 SYSCLK, 6.5 SYSCLK, 7.5 SYSCLK
	ISA Guaranteed Access Time	Disabled	Enabled
		Note: ISA Bus Masters that use DMA may not function properly if this feature is disabled.	
	Delayed Transactions	Enabled	Disabled
Bus Speed	ISA Bus Speed	8.25 MHz	11.0 MHz
		Note: The speed shown is based on the Host Bus Speed setting. See page 8.	
Miscellaneous	Speaker Config	Enabled	Disabled
	Watchdog Timer Delay	1.2 sec	150 msec
	Allocate USB Resources	Disabled	Enabled
PS/2 Mouse	PS/2 Mouse Config	Disabled	Enabled

Table 7. PCI Options

Item	Option	Default Setting	Alternate Settings
IRQs Setup	PCI IRQ Line 1	IRQ9	Disabled, IRQ5, IRQ10, IRQ11, IRQ12, IRQ14, IRQ15
	PCI IRQ Line 2	IRQ10	Disabled, IRQ5, IRQ9, IRQ11, IRQ12, IRQ14, IRQ15
	PCI IRQ Line 3	IRQ11	Disabled, IRQ5, IRQ9, IRQ10, IRQ12, IRQ14, IRQ15
	PCI IRQ Line 4	IRQ15	Disabled, IRQ5, IRQ9, IRQ10, IRQ11, IRQ12, IRQ14
	Note: PCI devices can share a common interrupt. However, some third-party PCI devices cannot share a common interrupt and will not function properly unless routed to a dedicated interrupt. **Note:** • IRQ5 will not be available for PCI devices, if the Parallel Port Address is set to IRQ5 (Advanced Options, page 22). • IRQ12 will not be available for PCI devices, if the PS/2 Mouse feature is enabled (Advanced Options, page 22). • IRQ14 will not be available for PCI devices, if the IDE controller is enabled for Fixed Disks (Basic Options, page 21).		
PCI Devices	**Note:** Each PCI device will be listed	• Bus: Device • Function • VenID: DevID • Device Type • IRQ Binding • Base I/O • Base Memory	N/A
PCI Performance	Delay for PCI Config	Disabled	Enabled
	PCI Latency for Bus 0 Devices 0Dh—14h	Auto	08, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176, 184, 192, 200, 208, 216, 224, 232, 240, 248
	PCI Cache Line Size	Auto	08, 16, 24, 32, 40, 48, 56, 64
Onboard SCSI	Onboard PCI SCSI	Disabled	Enabled

Notes

3 Technical Data

This chapter provides the following information:

- System specifications and environmental tolerances
- Pin positions and signal listings for all headers and connectors
- Notes on installing memory modules

Specifications

Overview

Listed in the table below are system specifications and environmental tolerances for the EPC-2102 series SBC.

Note: These specifications are subject to change without notice.

Environmental

Table 8. Environmental Tolerances

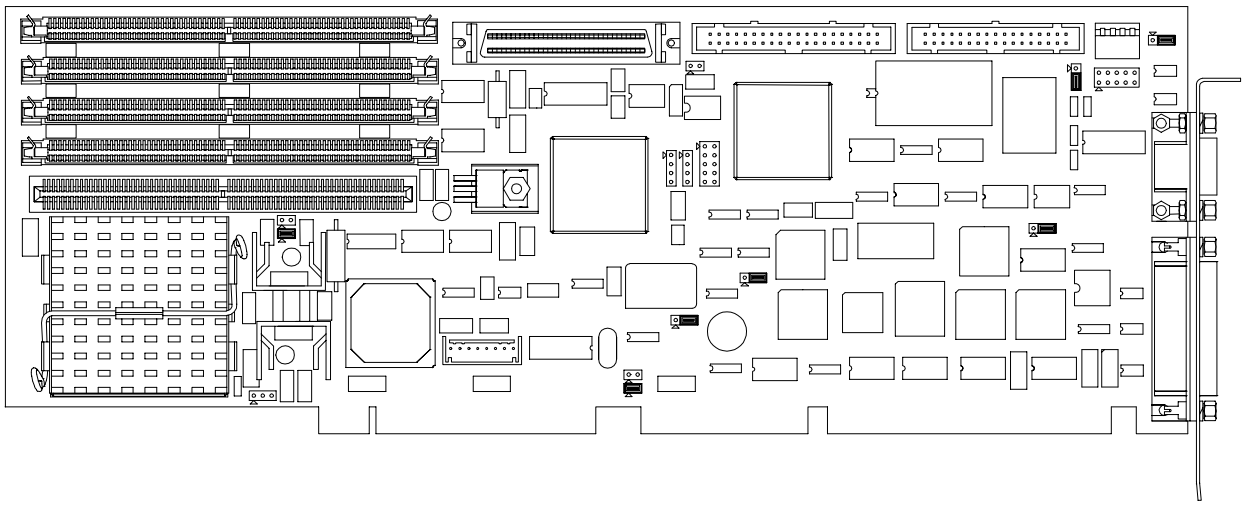
Temperature	Operating: 0 to +60 °C (32 to 140 °F) Non-Operating: -40 to +70 °C (-40 to 158 °F)
Humidity	Operating: 5 — 95% @ 40 °C, non-condensing Non-Operating: 0 — 95% @ 40 °C, non-condensing
Shock	Operating: 1.25 G @ 10 ms (10 G in appropriate chassis) Non-Operating: 30 G @ 10 ms (40 G in appropriate chassis)
Vibration	Operating:. 1 G @ 5 — 100 Hz Non-Operating: 5 G @ 5 — 200 Hz
Altitude	Operating: 15,000 ft (4,572 m) Non-Operating: 50,000 ft (15,240 m)

About Thermal Data

RadiSys validates the operating specifications of its products by testing with the most demanding hardware and software configurations to maximize the power supply draw and generate a worst-case scenario. Despite these efforts, the specifications outlined above are only benchmarks and should be regarded as such.

The SBC requires a minimum airflow of 200 linear feet per minute (LFM) unimpeded across the CPU within 5 to 60 °C (41 to 140 °F) ambient temperature. Operations outside these specifications could void the warranty.

Figure 9. The EPC-2102 Series SBC



System

Table 9. System Specifications

CPU	• 100, 133, 166 MHz Intel™ Pentium® Processor • 166, 200, or 233 MHz Pentium Processor with MMX™ Technology
Chipset	Intel 430HX PCIset
Cache	256 KB or 512 KB Level 2 write-back cache: Zero wait state at 66 MHz 8 ns synchronous pipeline burst COAST RAM
Memory	Four 72-pin sockets organized in two banks, supporting: Up to 256 MB 1/2/4/8/16 x 32/36, 60/70 ns, Fast Page Mode DRAM SIMMs Parity/FPM or Non-Parity ECC or up to 128 MB EDO Single bit error correction, double bit detection (ECC mode only)
Addressing	Real and protected mode supported Real address mode: 20-bit Protected address mode: 16-bit on bus access
Data Path	64-bit on board: 16-bit on ISA bus access, 32-bit on PCI local bus
Flash Memory	4 Mb (512 KB x 8)
Clock/Calendar	DS12887-compatible Real-Time Clock accurate to +/- 12 minutes/year, at 25 °C; includes CMOS
Power Requirements w/ 8 — 256 MB DRAM	Input Power 21 — 35 W +5 V 4.3 — 7.0 A +12 V 0.1 A -12 V 0.1 A
Form Factor	13.28" (33.73 cm) x 4.80" (12.19 cm)

Pin Signals

The tables below list the pin signals for the serial and parallel ports. The following illustration (Figure 10) indicates the pin positions for each

Table 10. Serial and Parallel Port Pin Signals

Serial Port 1	
RS-232	
Pin	Description
DE9P	
1	Data Carrier Detect (In)
2	Receive Data (In)
3	Transmit Data (Out)
4	Data Terminal Ready (Out)
5	Ground
6	Data Set Ready (In)
7	Request to Send (Out)
8	Clear to Send (In)
9	Ring Indicator (In)

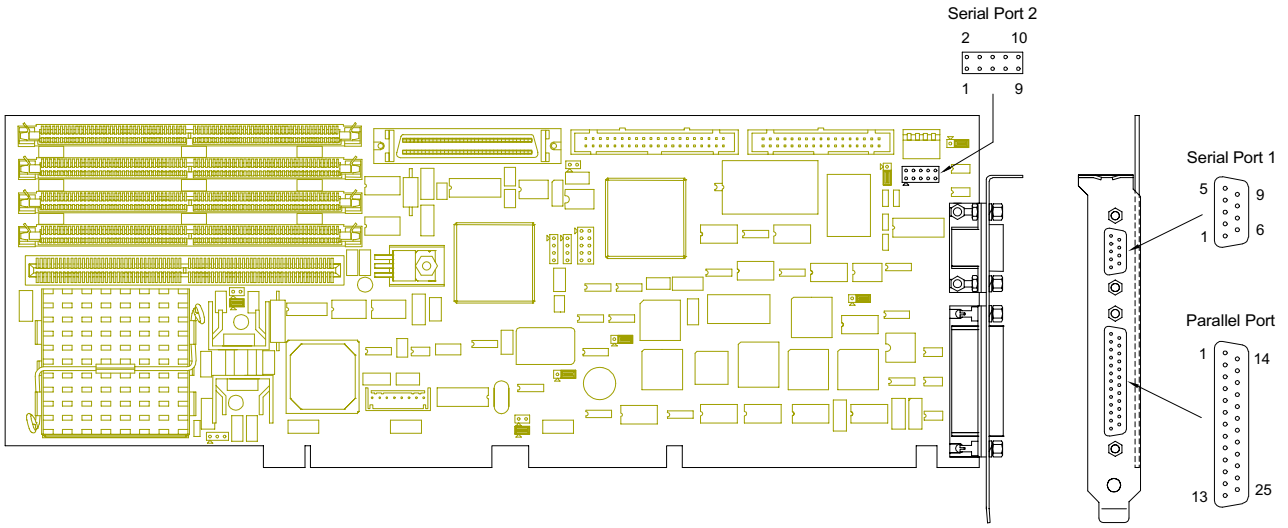
Serial Port 2				
RS-232		RS-422		
10-Pin	Description	Pin		Description
		DE9P	10-Pin	
1	Data Carrier Detect (In)	1	1	/Z Output (TX-)
2	Data Set Ready (In)	6	2	/B Receive (RX-)
3	Receive Data (In)	2	3	Y Output (TX+)
4	Request to Send (Out)	8	6	A Receive (RX+)
5	Transmit Data (Out)			
6	Clear to Send (In)			
7	Data Terminal Ready (Out)			
8	Ring Indicator (In)			
9	Ground			
10	N/C			

To connect two RS-422 devices, use a shielded twisted-pair (STP) cable no longer than 4,000 feet, configured as listed below:

Machine A Pin Signal		Machine B Pin Signal
/Z Output (TX-)	⟷	/B Receive (RX-)
Y Output (TX+)	⟷	A Receive (RX+)
/B Receive (RX-)	⟷	/Z Output (TX-)
A Receive (RX+)	⟷	Y Output (TX+)

Parallel Port (DB25S)			
Pin	Description	Pin	Description
1	- Strobe	10	- Acknowledge
2	Data Bit 0	11	+ Busy
3	Data Bit 1	12	+ Paper Feed
4	Data Bit 2	13	+ Select
5	Data Bit 3	14	- Auto Feed
6	Data Bit 4	15	- Error
7	Data Bit 5	16	- Initialize Printer
8	Data Bit 6	17	- Select Input
9	Data Bit 7	18-25	Ground

Figure 10. Serial and Parallel Headers and Connectors



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Pin Signals (continued)

The tables below list the pin signals for each peripheral header. The following illustration (Figure 11) indicates the pin positions for each.

Table 11. Peripheral Header Pin Signals

EIDE			
Pin	**Description**	**Pin**	**Description**
1	Reset (Out)	21	DMA Request (I/O)
3	Data 7 (I/O)	23	- I/O Write (Out)
4	Data 8 (I/O)	25	- I/O Read (Out)
5	Data 6 (I/O)	27	I/O Channel Ready (In)
6	Data 9 (I/O)	28	+ ALE
7	Data 5 (I/O)	29	DMA Acknowledge(Out)
8	Data 10 (I/O)	31	+ IRQ14 (In)
9	Data 4 (I/O)	32	I/O CS16 (Out)
10	Data 11 (I/O)	33	+ ADDR1 (Out)
11	Data 3 (I/O)	34	Passed Diagnostics
12	Data 12 (I/O)	35	+ ADDR0 (Out)
13	Data 2 (I/O)	36	+ ADDR2 (Out)
14	Data 13 (I/O)	37	- CS0 (Out)
15	Data 1 (I/O)	38	- CS1 (Out)
16	Data 14 (I/O)	39	Activity Light (Out)
17	Data 0 (I/O)	2, 19, 22, 24, 26, 30, 40	Ground
18	Data 15 (I/O)		
20	Not Connected		

PS/2 Mouse	
Pin	**Description**
1	Data
2	Clock
3-8	Not Connected
9	Ground
10	+5 V

Keyboard		
Pin Signals on Board	**Description**	**Pin Signals on Cable**
1	Reset	8
2	Ground	7
3	Not Connected	6
4	Keyboard Clock	5
5	Keyboard Data	4
6	Keyboard Lock	3
7	+5 V	2
8	Speaker	1

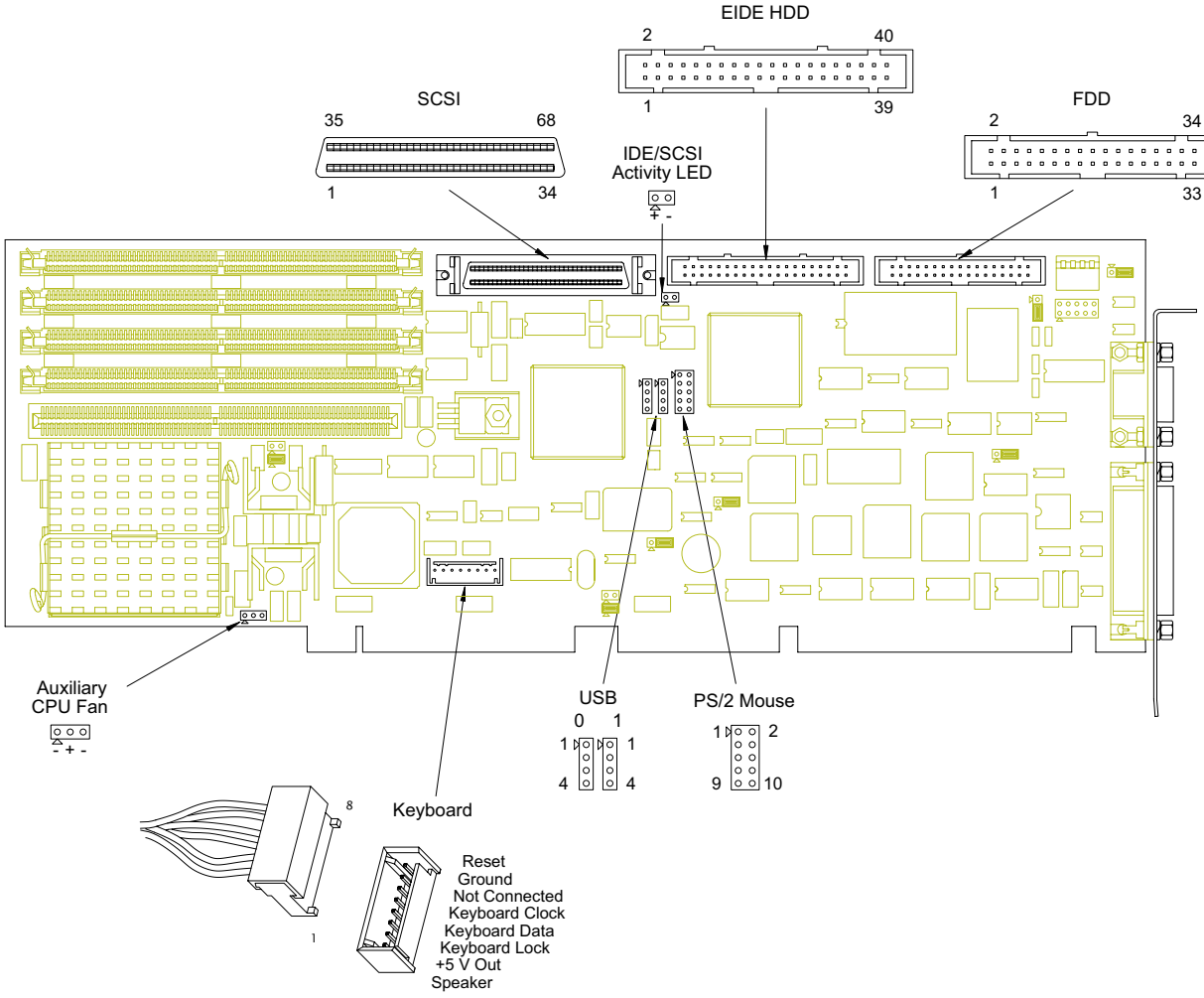
SCSI			
Pin	**Description**	**Pin**	**Description**
35	DB12 (I/O)	59	- RST (I/O)
36	DB13 (I/O)	60	- MSG (In)
37	DB14 (I/O)	61	- SEL (I/O)
38	DB15 (I/O)	62	- CD (In)
39	DBPH (I/O)	63	- REQ (In)
40	DB0 (I/O)	64	- I/O (In)
41	DB1 (I/O)	65	DB8 (I/O)
42	DB2 (I/O)	66	DB9 (I/O)
43	DB3 (I/O)	67	DB10 (I/O)
44	DB4 (I/O)	68	DB11 (I/O)
45	DB5 (I/O)	19, 53	Reserved
46	DB6 (I/O)	17-18, 51-52	TRMPWR
47	DB7 (I/O)		
48	DBPL (I/O)	1-16, 20-34, 49-50, 54, 56	Ground
55	- ATN (Out)		
57	- BSY (I/O)		
58	-ACK (Out)		

USB	
Pin	**Description**
1	USB Port +
2	Ground
3	USB Port -
4	+5 V

IDE/SCSI Activity LED	
Pin	**Description**
1	+5 V
2	Drive LED

Auxiliary CPU Fan	
Pin	**Description**
1	Ground
2	+12 V
3	Ground

Figure 11. Peripheral Headers



To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Installing Memory

Overview

The EPC-2102 supports up to 256 MB of on-board dynamic RAM modules in Parity/FPM or Non-Parity, ECC, or up to 128 MB EDO.

Memory Bank

The EPC-2102 contains four 72-pin SIMM sockets for DRAM memory modules (Figure 12). These four sockets comprise two memory banks, each consisting of two sockets and providing a 64-bit wide data path and 8 parity bits (x36 SIMMs only):

- Sockets 1 and 2 comprise Bank 0
- Sockets 3 and 4 comprise Bank 1

Each bank must be completely filled to be operable. Also, both sockets in a bank must be filled with SIMMs of identical size. For example, if an 16MB SIMM is installed in Socket 1, another 16MB SIMM must be installed in Socket 2.

SIMM Types

Five SIMM memory sizes (4, 8, 16, 32, and 64 MB) are supported. SIMMs of these sizes can be installed in sockets 1, 2, 3, or 4 in combinations as illustrated in Table 12.

Memory size is detected by the system BIOS. Memory timing requires 70 ns or faster page devices. Parity generation and checking is provided for each byte.

The SIMM sockets are gold and require gold SIMMs. Use of tin/lead SIMMs can cause damage to the equipment and could void the warranty.

To avoid damage or injury, always power-off the system and disconnect all power cords from their power source before handling the equipment.
To help prevent accidental damage that can be caused by static discharge, always use a grounding wrist strap or other static-dissipating device when accessing the interior of the chassis and handling the equipment.

Figure 12. Memory Combinations

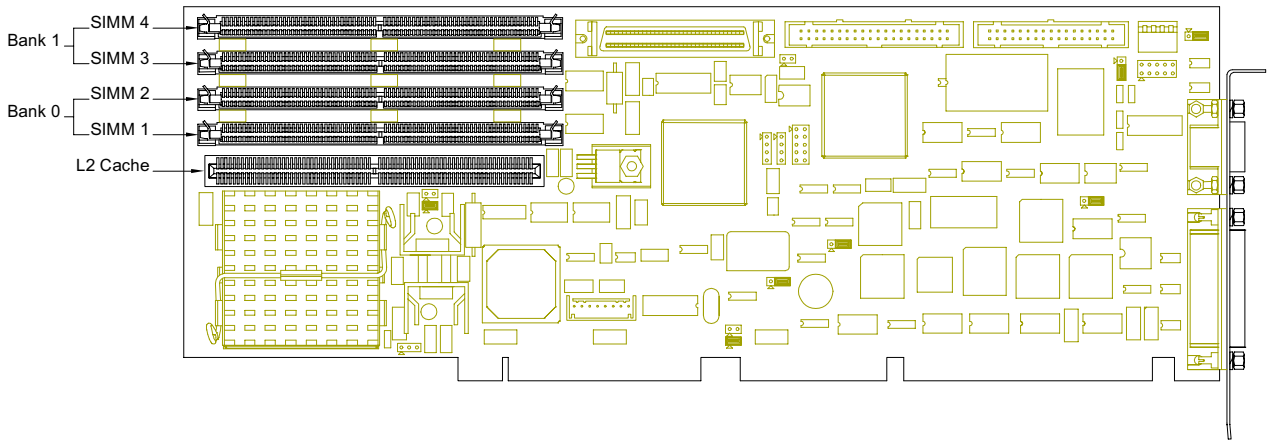


Table 12. Memory Combinations

SIMM 1 & 2	SIMM 3 & 4	Total Memory
1 MB x 3X (4 MB)	Empty	8 MB
1 MB x 3X (4 MB)	1 MB x 3X (4 MB)	16 MB
2 MB x 3X (8 MB)	Empty	16 MB
2 MB x 3X (8 MB)	1 MB x 3X (4 MB)	24 MB
2 MB x 3X (8 MB)	2 MB x 3X (8 MB)	32 MB
4 MB x 3X (16 MB)	Empty	32 MB
4 MB x 3X (16 MB)	1 MB x 3X (4 MB)	40 MB
4 MB x 3X (16 MB)	2 MB x 3X (8 MB)	48 MB
4 MB x 3X (16 MB)	4 MB x 3X (16 MB)	64 MB
8 MB x 3X (32 MB)	Empty	64 MB
8 MB x 3X (32 MB)	1 MB x 3X (4 MB)	72 MB
8 MB x 3X (32 MB)	2 MB x 3X (8 MB)	80 MB
8 MB x 3X (32 MB)	4 MB x 3X (16 MB)	96 MB
8 MB x 3X (32 MB)	8 MB x 3X (32 MB)	128 MB
16 MB x 3X (64 MB)	Empty	128 MB
16 MB x 3X (64 MB)	1 MB x 3X (4 MB)	136 MB
16 MB x 3X (64 MB)	2 MB x 3X (8 MB)	144 MB
16 MB x 3X (64 MB)	4 MB x 3X (16 MB)	160 MB
16 MB x 3X (64 MB)	8 MB x 3X (32 MB)	192 MB
16 MB x 3X (64 MB)	16 MB x 3X (64 MB)	256 MB
3X = 36 for Parity, 32 for Non-Parity		

Notes